

FORM PTO-1390 (Modified) (REV 11-2000)		U.S. DEPARTMENT OF COMMERCE PATENT AND TRADEMARK OFFICE	
TRANSMITTAL LETTER TO THE UNITED STATES DESIGNATED/ELECTED OFFICE (DO/EO/US) CONCERNING A FILING UNDER 35 U.S.C. 371		ATTORNEY'S DOCKET NUMBER RAG-14302/08	
INTERNATIONAL APPLICATION NO. PCT/EP00/08824		INTERNATIONAL FILING DATE 09.09.00 (09 Sept. 2000)	
PRIORITY DATE CLAIMED 21.09.99 (21 Sept. 1999)			
TITLE OF INVENTION TUBULAR COUPLING ELEMENT FOR PRODUCING A GLUED JOINT WITH A FLUID LINE			
APPLICANT(S) FOR DO/EO/US BREMONT, Michel; ZUANNA, Cyrille; PAPIER, Yves; MORETTI, Erminio; PERRIR, Gilles; RAYMOND, Albert			
Applicant herewith submits to the United States Designated/Elected Office (DO/EO/US) the following items and other information:			
<p>1. <input checked="" type="checkbox"/> This is a FIRST submission of items concerning a filing under 35 U.S.C. 371.</p> <p>2. <input type="checkbox"/> This is a SECOND or SUBSEQUENT submission of items concerning a filing under 35 U.S.C. 371.</p> <p>3. <input checked="" type="checkbox"/> This is an express request to begin national examination procedures (35 U.S.C. 371(f)) The submission must include items (5), (6), (9) and (24) indicated below.</p> <p>4. <input checked="" type="checkbox"/> The US has been elected by the expiration of 19 months from the priority date (Article 31).</p> <p>5. <input checked="" type="checkbox"/> A copy of the International Application as filed (35 U.S.C. 371 (c) (2)) <ul style="list-style-type: none"> a. <input type="checkbox"/> is attached hereto (required only if not communicated by the International Bureau). b. <input checked="" type="checkbox"/> has been communicated by the International Bureau. c. <input type="checkbox"/> is not required, as the application was filed in the United States Receiving Office (RO/US). </p> <p>6. <input checked="" type="checkbox"/> An English language translation of the International Application as filed (35 U.S.C. 371(c)(2)). <ul style="list-style-type: none"> a. <input checked="" type="checkbox"/> is attached hereto. b. <input type="checkbox"/> has been previously submitted under 35 U.S.C. 154(d)(4) </p> <p>7. <input checked="" type="checkbox"/> Amendments to the claims of the International Application under PCT Article 19 (35 U.S.C. 371 (c)(3)) <ul style="list-style-type: none"> a. <input checked="" type="checkbox"/> are attached hereto (required only if not communicated by the International Bureau). b. <input type="checkbox"/> have been communicated by the International Bureau. c. <input type="checkbox"/> have not been made; however, the time limit for making such amendments has NOT expired. d. <input type="checkbox"/> have not been made and will not be made. </p> <p>8. <input checked="" type="checkbox"/> An English language translation of the amendments to the claims under PCT Article 19 (35 U.S.C. 371(c)(3)).</p> <p>9. <input checked="" type="checkbox"/> An oath or declaration of the inventor(s) (35 U.S.C. 371 (c)(4)).</p> <p>10. <input checked="" type="checkbox"/> An English language translation of the annexes to the International Preliminary Examination Report under PCT Article 36 (35 U.S.C. 371 (c)(5))</p> <p>11. <input checked="" type="checkbox"/> A copy of the International Preliminary Examination Report (PCT/IPEA/409).</p> <p>12. <input checked="" type="checkbox"/> A copy of the International Search Report (PCT/ISA/210)</p>			
Items 13 to 20 below concern document(s) or information included: <p>13. <input type="checkbox"/> An Information Disclosure Statement under 37 CFR 1.97 and 1.98</p> <p>14. <input type="checkbox"/> An assignment document for recording A separate cover sheet in compliance with 37 CFR 3.28 and 3.31 is included.</p> <p>15. <input checked="" type="checkbox"/> A FIRST preliminary amendment.</p> <p>16. <input type="checkbox"/> A SECOND or SUBSEQUENT preliminary amendment</p> <p>17. <input type="checkbox"/> A substitute specification.</p> <p>18. <input type="checkbox"/> A change of power of attorney and/or address letter.</p> <p>19. <input type="checkbox"/> A computer-readable form of the sequence listing in accordance with PCT Rule 13ter.2 and 35 U.S.C. 1.821 - 1.825</p> <p>20. <input type="checkbox"/> A second copy of the published international application under 35 U.S.C. 154(d)(4).</p> <p>21. <input type="checkbox"/> A second copy of the English language translation of the international application under 35 U.S.C. 154(d)(4).</p> <p>22. <input checked="" type="checkbox"/> Certificate of Mailing by Express Mail</p> <p>23. <input checked="" type="checkbox"/> Other items or information.</p>			
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U.S. APPLICATION NO. (IF KNOWN, SEE 37 CFR 1.5) 10,088575	INTERNATIONAL APPLICATION NO. PCT/EP00/08824	ATTORNEY'S DOCKET NUMBER RAG-14302/08																				
24. The following fees are submitted.	CALCULATIONS PTO USE ONLY																					
BASIC NATIONAL FEE (37 CFR 1.492 (a) (1) - (5)) :																						
<input type="checkbox"/> Neither international preliminary examination fee (37 CFR 1.482) nor international search fee (37 CFR 1.445(a)(2)) paid to USPTO and International Search Report not prepared by the EPO or JPO. \$1040.00 <input checked="" type="checkbox"/> International preliminary examination fee (37 CFR 1.482) not paid to USPTO but International Search Report prepared by the EPO or JPO \$890.00 <input type="checkbox"/> International preliminary examination fee (37 CFR 1.482) not paid to USPTO but international search fee (37 CFR 1.445(a)(2)) paid to USPTO \$740.00 <input type="checkbox"/> International preliminary examination fee (37 CFR 1.482) paid to USPTO but all claims did not satisfy provisions of PCT Article 33(1)-(4) \$710.00 <input type="checkbox"/> International preliminary examination fee (37 CFR 1.482) paid to USPTO and all claims satisfied provisions of PCT Article 33(1)-(4) \$100.00																						
ENTER APPROPRIATE BASIC FEE AMOUNT =																						
Surcharge of \$130.00 for furnishing the oath or declaration later than months from the earliest claimed priority date (37 CFR 1.492 (e)). <input type="checkbox"/> 20 <input type="checkbox"/> 30 \$0.00																						
<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>CLAIMS</th> <th>NUMBER FILED</th> <th>NUMBER EXTRA</th> <th>RATE</th> </tr> </thead> <tbody> <tr> <td>Total claims</td> <td>6 - 20 =</td> <td>0</td> <td>x \$18.00 \$0.00</td> </tr> <tr> <td>Independent claims</td> <td>2 - 3 =</td> <td>0</td> <td>x \$84.00 \$0.00</td> </tr> <tr> <td colspan="2">Multiple Dependent Claims (check if applicable)</td> <td></td> <td><input type="checkbox"/> \$0.00</td> </tr> <tr> <td colspan="2" style="text-align: center;">TOTAL OF ABOVE CALCULATIONS</td> <td>=</td> <td>\$890.00</td> </tr> </tbody> </table>			CLAIMS	NUMBER FILED	NUMBER EXTRA	RATE	Total claims	6 - 20 =	0	x \$18.00 \$0.00	Independent claims	2 - 3 =	0	x \$84.00 \$0.00	Multiple Dependent Claims (check if applicable)			<input type="checkbox"/> \$0.00	TOTAL OF ABOVE CALCULATIONS		=	\$890.00
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Fee for recording the enclosed assignment (37 CFR 1.21(h)). The assignment must be accompanied by an appropriate cover sheet (37 CFR 3.28, 3.31) (check if applicable). <input checked="" type="checkbox"/> \$40.00																						
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a. <input checked="" type="checkbox"/> A check in the amount of \$930.00 to cover the above fees is enclosed. b. <input type="checkbox"/> Please charge my Deposit Account No. _____ in the amount of _____ to cover the above fees. A duplicate copy of this sheet is enclosed. c. <input checked="" type="checkbox"/> The Commissioner is hereby authorized to charge any additional fees which may be required, or credit any overpayment to Deposit Account No. 07-1180 A duplicate copy of this sheet is enclosed d. <input type="checkbox"/> Fees are to be charged to a credit card. WARNING: Information on this form may become public. Credit card information should not be included on this form. Provide credit card information and authorization on PTO-2038																						
NOTE: Where an appropriate time limit under 37 CFR 1.494 or 1.495 has not been met, a petition to revive (37 CFR 1.137(a) or (b)) must be filed and granted to restore the application to pending status.																						
SEND ALL CORRESPONDENCE TO: <div style="border: 1px solid black; padding: 5px;"> ANDERSON, Thomas E. Gifford, Krass, Groh, Sprinkle, Anderson & Citkowski, P.C. 280 North Old Woodward, Suite 400 Birmingham, MI 48009 248-647-6000 </div>																						
<div style="border: 1px solid black; padding: 10px; margin-top: 10px;"> The PTO did not receive the following listed item(s) <u>No assignment</u> </div>																						
 SIGNATURE Thomas E. Anderson NAME _____ 31,318 REGISTRATION NUMBER _____ 3/18/02 DATE _____																						

1/p215

TUBULAR COUPLING ELEMENT FOR PRODUCING
A GLUED JOINT WITH A FLUID LINE

Description

5 The invention pertains to a tubular coupling element for producing a glued joint with a fluid line, wherein the coupling element consists of an inner tube that can be inserted into the fluid line and an outer tube that is realized concentric to the inner tube and integrally formed on the rear end of the inner tube with a closed ring.

10 A coupling element of this type is known from DT 26 03 299 A1. In this case, the annular gap between the inner tube and the outer tube is filled with a liquid adhesive, namely such a quantity of the adhesive that the respective intermediate spaces between the fluid line and the inner tube and the outer tube are entirely filled out after the fluid line is pressed in. The adhesive consists of two liquid components that are held in the annular gap by removable separating and cover films. The utilization of liquid adhesive components has the disadvantage that the films initially need to be removed at the 15 construction site before the tubular end of the fluid line can be inserted into the annular gap. In addition, the tubular end of the fluid line and the coupling element need to be held in an axially aligned position until the adhesive has hardened. One also needs to proceed very carefully when filling in the adhesive components, when correctly metering said components and when sealing the annular gap in an air-tight fashion.

20 A tubular coupling element of this type is also known from DE 44 42 407 C1. In this case, the annular gap is filled with a hardenable sealing or binding agent and then closed with a removable air-tight cover. This also results in the aforementioned disadvantages, namely that the cover film initially needs to be removed at the construction site before the tubular end of the fluid line can be inserted into the annular 25 gap in order to produce the glued joint.

The invention is based on the objective of realizing and filling the annular gap with a suitable adhesive in such a way that the coupling elements can be rapidly and easily connected to the end sections of fluid lines.

According to the invention, this objective is attained by filling the annular gap 30 between the inner tube and the outer tube with a dry hot-melt adhesive that is compacted into the shape of a solid ring.

35 Due to these measures, a glued joint between the end of a fluid line and the coupling element can be produced in a much simpler and less expensive fashion than with the state of the art. Since the hot-melt adhesive is introduced into the gap in the form of a solid compacted ring, it can also be retained therein without cover elements and reactivated for use at any time by applying heat. The method according to the invention also makes it possible to easily connect fluid lines and coupling elements to one another

if the coupling housing consists of a plastic material and the fluid line consists of an aluminum tube or a metal tube that is encased with plastic as increasingly utilized in modern technology.

5 The dependent claims disclose advantageous additional developments of the invention that serve for achieving the individual advantages described below:

According to Claim 2, the design of the inner tube serves for producing a centered contact with the end region of the fluid line while the hot-melt adhesive is able to distribute between the longitudinal ribs.

10 The design of the outer tube in accordance with Claim 3 makes it possible for the adhesive inserted between the inner tube and the outer tube to flow outward along the ribs when it is subjected to heat such that a uniform distribution of the adhesive is ensured.

15 The method for producing a glued joint proposed in Claim 4 advantageously describes how the ring of adhesive introduced into the annular gap can be rapidly heated while the fluid line is inserted, and how the end of the fluid line can be properly pressed into the melting adhesive.

One preferred embodiment of the invention is illustrated in the figures and described in greater detail below. The figures show:

20 Figure 1, a side view of a coupling housing with a partial section through the coupling element along the line I-I in Figure 2;

Figure 2, a lateral section through the coupling element along the line II-II in Figure 1;

25 Figure 3, a longitudinal section through a compacted adhesive ring to be inserted into the annular gap of the coupling element;

Figure 4, a schematic presentation of a coupling housing with a pressed-in adhesive ring;

Figures 5 and 6, the sequence of producing a glued joint between the coupling element and the fluid line, and

Figure 7, the finished glued joint between the fluid line and the coupling element.

30 Figures 1 and 2 show a tubular coupling element 1 that is integrally connected to a coupling housing 2 of plastic. As indicated in Figure 7, this coupling element 1 serves for producing a glued joint with a fluid line 3 that, for example, consists of an aluminum tube or another suitable metal tube. The coupling element 1 may, however, also be integrally formed on a plug-in element that is not illustrated in the figures and conventionally inserted into the coupling housing 2 in order to produce a separable plug-type connection.

The coupling element 1 consists of an inner tube 4 that is inserted into the free end 20 of the fluid line 3 and an outer tube 5 that is realized concentric to the inner tube and connected to the rear end of the inner tube 4 by means of a closed ring 6. On its outer surface 7, the inner tube 4 contains at least three longitudinal ribs 8 that serve for producing a centered contact with the inner wall 9 of the fluid line 3 when it is pushed over the inner tube 4 (Figure 6).

On its inner side, the outer tube 5 is provided with a series of axially parallel grooves 10 that are distributed over the circumference, wherein the summits 11 of said grooves have an inside diameter d_2 that is a slightly larger than the outside diameter D of the fluid line 3. The length of the outer tube 5 preferably corresponds approximately to the outside diameter D of the fluid line 3, wherein the inner tube 4 is longer than the outer tube 5 by approximately one-half.

In order to produce a glued joint between the tubular coupling element 1 and the fluid line 3, the annular gap 13 between the inner tube 4 and the outer tube 5 is filled with the hot-melt adhesive to approximately half its depth, wherein the hot-melt adhesive is introduced in the form of a compacted solid ring 14 (Figure 3). The outside diameter D_1 of this ring 14 is slightly smaller than the inside diameter d_2 of the summits 11, wherein the inside diameter d_1 of the ring 14 approximately corresponds to the inside diameter d of the fluid line 3. The width B of the ring 14 has such dimensions that the ring 14 fills out approximately half the depth of the annular gap 13.

After inserting the ring 14 into the annular gap 13 in the direction of the arrow P , the ring 14 is pressed into the gap until it contacts the connecting ring 6 (Figure 4), preferably with the aid of an auxiliary tool 15 that contains a few circumferentially distributed pressing elements 16. The coupling element 1 which is now filled with the adhesive is ready for gluing to the free end 20 of the fluid line 3. The sequence of this gluing process is illustrated in Figures 5 and 6.

The coupling housing 2 is initially held in position with a coupling holder 17 while the fluid line 3 is moved into the opposite position along an imaginary extension of the coupling housing axis by means of a tube holder 18. An induction coil 19 is now placed around the free end 20 of the fluid line 3 such that the tubular end 20 of the fluid line can be preheated (Figure 5).

The coupling element 1 is then pressed on the free end 20 of the fluid line 3 in the direction of the arrow M by means of the holder 17 and thusly surrounded by the induction coil 19. The adhesive ring 14 melts due to the thermal effect generated by the induction coil. While the tubular end 20 of the fluid line 3 penetrates into the hot-melt adhesive, the adhesive is displaced on the inner wall 9 and the outer wall 12 along the ribs 8 and the grooves 10 in the inserting direction M . This causes the intermediate

spaces between the tubular end 20 of the fluid line and the coupling element 1 to be completely filled out with the hot-melt adhesive (Figure 6).

After the hot-melt adhesive has set and pre-hardened, the process of connecting the coupling element 1 and the fluid line 3 is concluded to such a degree that the holders 5 17 and 18 can be removed for a possibly required hardening process (Figure 7). The coupling 2 with the fluid line 3 glued thereto can then be transported to the site of its intended use.

In the embodiment shown, the tube holder 18 is symbolically illustrated in the form of a solid body with a so-called blind hole, into which the fluid line 3 is inserted 10 with its outgoing end. However, the tube holder may also consist of a clamping element that surrounds the fluid line 3, e.g., a pipe clamp. This is particularly advantageous if the fluid line 3 has a greater length than shown in Figures 5 and 6.

Claims

1 1. Tubular coupling element for producing a glued joint with a fluid
2 line, wherein the coupling element (1) consists of an inner tube (4) that can be
3 inserted into the fluid line (3) and an outer tube (5) that is constructed
4 concentric to the inner tube and integrally formed on the rear end of the inner
5 tube (4) with a closed ring (6), and wherein the annular gap (13) between the
6 inner tube (4) and the outer tube (5) is filled with such a quantity of an
7 adhesive that the respective intermediate spaces between the fluid line (3) and
8 the inner tube (4) and the outer tube (5) are entirely filled out after the fluid
9 line (3) is pressed in, characterized by the fact that the annular gap (13) is
10 filled with a dry hot-melt adhesive that is compacted into a solid ring (14).

1 2. Tubular coupling element according to Claim 1, characterized by the
2 fact that the outer surface (7) of the inner tube (4) is provided with at least
3 three longitudinal ribs (8) that serve for producing a centered contact with the
4 inner wall (9) of the fluid line (3).

1 3. Tubular coupling element according to Claim 1 or 2, characterized
2 by the fact that the inner side of the outer tube (5) contains a series of axially
3 parallel grooves (10) that are distributed over the circumference, wherein the
4 summits (11) of said grooves have an inside diameter (d2) that is slightly
5 larger than the outside diameter (D) of the fluid line (3)

1 4. Method for producing a glued joint between the tubular coupling
2 element according to Claim 1 and a fluid line, characterized by the fact that,
3 the adhesive ring is heated to its melting temperature by rapidly applying heat
4 at the beginning of the process of connecting the fluid line (3) and the inner
5 tube (4), i.e., when the free tube end (20) contacts the adhesive ring (14), and
6 by the fact that the adhesive simultaneously begins to flow when the free end
7 (20) of the fluid line is pressed in, wherein a small portion of the adhesive is
8 pressed between the fluid line (3) and the inner tube (4), and the predominant
9 portion is pressed between the fluid line (3) and the outer tube (5).

1 5. Method for producing a glued joint between the tubular coupling
2 element and the fluid line according to Claim 4, characterized by the fact that
3 the free end (20) of the fluid line (3) is preheated by means of an induction
4 coil (19).

1 6. Method for producing a glued joint according to Claim 5,
2 characterized by the fact that the free end (20) of the fluid line (3) is pushed
3 onto the coupling element (1) together with the induction coil (19).

ABSTRACT

The invention relates to a tubular coupling element for producing a glued joint with a fluid line and to a method for producing such a glued joint. The inventive coupling element (1) consists of an inner tube (4) that is inserted in the fluid line (3) and an outer tube (5) that is configured concentrically with respect to the inner tube and that is integrally formed on the rear end of the inner tube (4) with a ring (6). The annular gap (13) present between the two tubes (4) and (5) is designed to receive the tube end (20) of the fluid line (3) and a hot-melt type adhesive in a compacted solid form shaped as a ring (14). The connection can be easily established by first introducing the adhesive in the annular gap (13) and then melting it by rapidly supplying heat while the tube end (20) of the fluid line (3) is pressed into the annular gap (13). The inventive design of the coupling element allows a rapid and lasting connection between a metal tube and a coupling housing or insertable plastic element using a reactivatable hot-melt type adhesive.

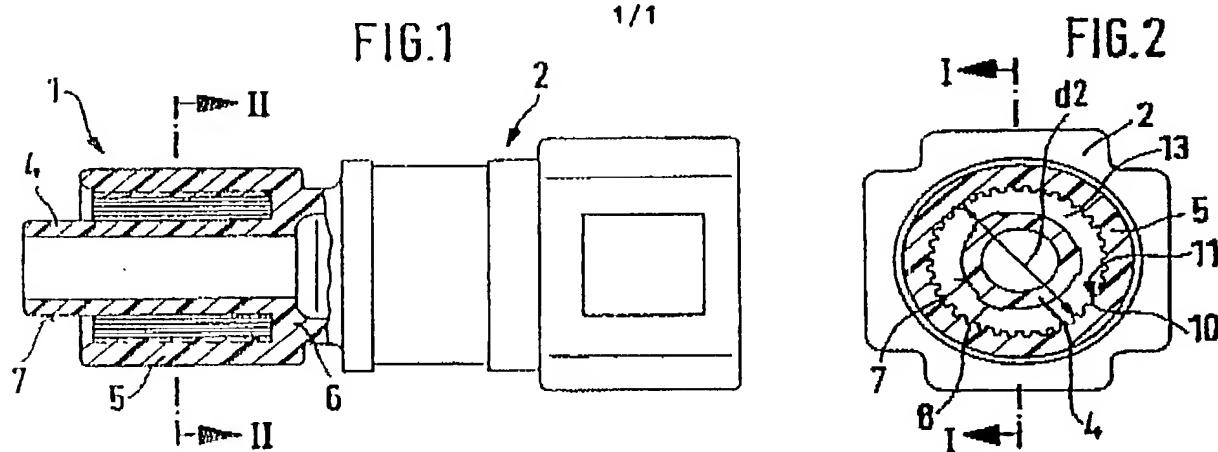


FIG. 3

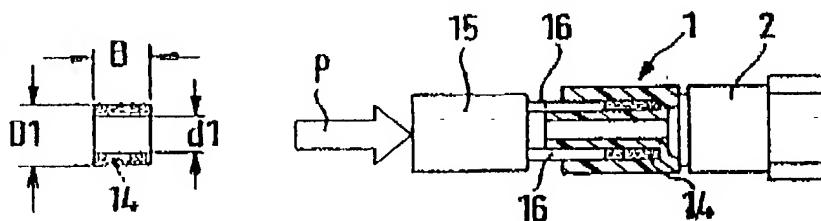


FIG. 4

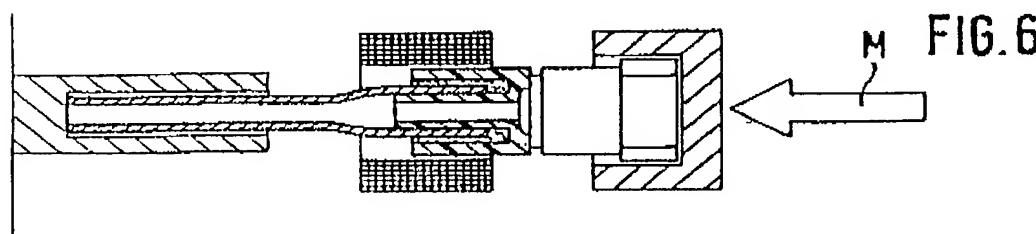
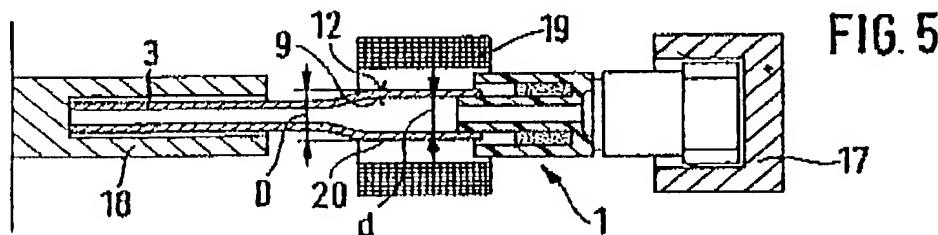
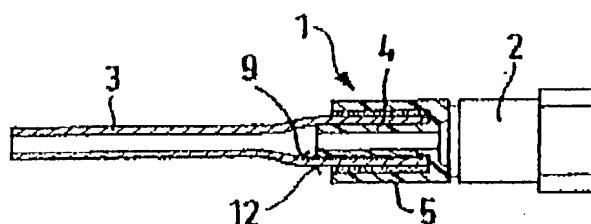


FIG. 7



O P E I hereby claim the benefit under 35 U.S.C. Section 119(e) of any United States provisional application(s) listed below:

MAY 10 2002

(Application Serial No.)

(Filing Date)

(Application Serial No.)

(Filing Date)

(Application Serial No.)

(Filing Date)

I hereby claim the benefit under 35 U. S. C. Section 120 of any United States application(s), or Section 365(c) of any PCT International application designating the United States, listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States or PCT International application in the manner provided by the first paragraph of 35 U.S.C. Section 112, I acknowledge the duty to disclose to the United States Patent and Trademark Office all information known to me to be material to patentability as defined in Title 37, C. F. R., Section 1.56 which became available between the filing date of the prior application and the national or PCT International filing date of this application:

(Application Serial No.)

(Filing Date)

(Status)

(patented, pending, abandoned)

(Application Serial No.)

(Filing Date)

(Status)

(patented, pending, abandoned)

(Application Serial No.)

(Filing Date)

(Status)

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I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

POWER OF ATTORNEY: As a named inventor, I hereby appoint the following attorney(s) and/or agent(s) to prosecute this application and transact all business in the Patent and Trademark Office connected therewith. (list name and registration number)

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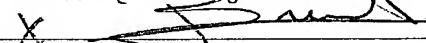
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Full name of sole or first inventor

BREMONT, Michel

Sole or first inventor's signature



Date



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FRANCE



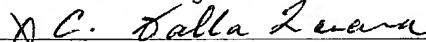
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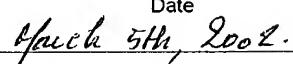
20
Full name of second inventor, if any

DALLA ZUANNA, Cyrille

Second inventor's signature



Date



Residence

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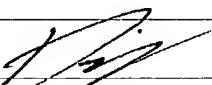
Citizenship
FRANCE



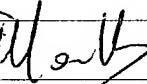
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300

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Third inventor's signature 	Date 11/02/2002
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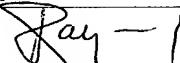
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Sixth inventor's signature 	Date 04/03/2002
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